IN THE CLAIMS

Please cancel claims 1, 3 through 6, 11, 13 through 15, 23, 25 through 28, and 32 through 35 without prejudice or disclaimer, amend claims 7, 12, 17, 20, 22 and 29, and add claims 48 through 78, as follows:

Claims 1 through 6. (Canceled)

7. (Currently Amended) [[The]] A cathode ~~of claim 1,~~ for an electron tube, comprising:

a metal base; and

an electron-emitting material layer coated on the metal base, said electron-emitting material layer comprising a needle-shaped conductive material;

said needle-shaped conductive material being at least one material selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum and platinum;

said needle-shaped conductive material being a carbonaceous material, said needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of said electron-emitting material layer, and a thickness of said electron-emitting material layer being in a range of 30 to 80 μm.

Claims 8 and 9. (Canceled)

10. (Previously Presented) A cathode for an electron tube, comprising:

a metal base; and

an electron-emitting material layer coated on the metal base, said electron-emitting material layer comprising a needle-shaped conductive material and having a surface roughness corresponding to a distance between a highest point and a lowest point on a surface of the electron-emitting material layer being less than 10 microns.

Claim 11. (Canceled)

12. (Currently Amended) The cathode of claim 10, said needle-shaped conductive material being at least one material selected from the group consisting essentially of ~~carbon,~~ indium tin oxide, nickel, magnesium, rhenium, molybdenum and platinum.

Claims 13 through 15. (Canceled)

16. (Previously Presented) The cathode of claim 10, said needle-shaped conductive material in the electron-emitting material layer being in a range of 0.01 to 30% by weight based on a total weight of said electron-emitting material.

17. (Currently Amended) The cathode of claim 10, said needle-shaped conductive

material being a carbonaceous material, said needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of said electron-emitting material layer, and [[the]] a thickness of said electron-emitting material layer being in a range of 30 to 80 μm.

Claims 18 and 19. (Canceled)

20. (Currently Amended) The cathode of claim [[11]] 10, further comprising a metal layer including nickel grains having sizes smaller than sizes of grains in said metal base, said metal layer being formed between said metal base and said electron-emitting material layer.

21. (Previously Presented) The cathode of claim 20, said metal layer further including at least one metal selected from the group consisting essentially of aluminum (Al), tungsten (W), tantalum (Ta), chromium (Cr), magnesium (Mg), silicon (Si) and zirconium (Zr).

22. (Currently Amended) The cathode of claim [[20]] 10, further comprising a metal layer formed between said metal base and said electron-emitting material layer, a thickness of said metal layer being in a range of 1 to 30 μm.

Claims 23 through 28. (Canceled)

29. (Currently Amended) [[The]] An oxide cathode ~~of claim 23,~~ for an electron tube, comprising:

a metal base; and

an electron-emitting material layer coated on the metal base, said electron-emitting material layer comprising a needle-shaped conductive material;

said needle-shaped conductive material being at least one material selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum and platinum;

said needle-shaped conductive material being a carbonaceous material, said needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of said electron-emitting material layer, and a thickness of said electron-emitting material layer being in a range of 30 to 80 μm.

Claims 30 through 35. (Canceled)

36. (Currently Amended) The method of claim [[35]] 75, wherein the coating step includes applying pressure on a coating layer in order to attain a desired level of surface roughness.

37. (Previously Presented) The method of claim 36, wherein the step of applying the pressure on the coating layer comprises at least one of printing, electrodeposition and

painting.

38. (Previously Presented) The method of claim 37, wherein the printing includes at least one of screen printing and roll coating.

39. (Currently Amended) The method of claim [[35]] 75, wherein the coating step comprises coating to a thickness in a range of 30 to 80 microns so as to obtain good electron emission characteristics.

40. (Currently Amended) The method of claim [[35]] 75, said needle-shaped conductive material in the electron-emitting material layer being in a range of 0.01 to 30% by weight based on a total weight of said electron-emitting material.

41. (Currently Amended) The method of claim [[35]] 75, further comprising the step, between the providing step and the coating step, of forming a metal layer on the metal base.

42. (Previously Presented) The method of claim 41, wherein the metal layer comprises nickel and a refractory metal to reinforce mechanical strength of the cathode.

43. (Previously Presented) The method of claim 41, further comprising the step, prior to forming the metal layer on the metal base, of mixing nickel powder and at least one of

tungsten and aluminum as a reducing agent to prepare a metal layer material.

44. (Previously Presented) The method of claim 43, further comprising the step, after the mixing step, of homogeneously mixing the metal layer material with an organic binder and a liquid-phase organic solvent to prepare a paste which, when deposited on the metal base, forms the metal layer on the metal base.

45. (Previously Presented) The method of claim 41, wherein the forming step comprises applying metal layer material to the metal base, and then thermally treating the applied metal layer material in one of a vacuum and an inert gas atmosphere to obtain the metal layer without organic matter.

46. (Previously Presented) The method of claim 41, wherein the forming step comprises one of printing, spraying, electrodeposition and painting.

47. (Currently Amended) A cathode prepared by the method of claim [[35]] 75.

48. (New) A cathode, comprising:

a metal base;

means disposed upon said base, for emitting electrons; and

means exhibiting a needle-shaped electrically conductive material exhibiting

a specific resistance not greater than 10^{-1} ohms centimeter, and comprising 0.01% by weight to 30% by weight of said layer, for providing electrically conducting paths through said means for emitting electrons.

49. (New) The cathode of claim 48, comprising a metal layer exhibiting a grain size smaller than said base interposed between said base and said layer.

50. (New) The cathode of claim 48, comprising said needle-shaped conductive material selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum and platinum.

51. (New) A cathode, comprising:

a metal base;

a layer of an electron-emitting material disposed upon said base; and

a needle-shaped electrically conductive material providing electrically conductive paths disposed throughout said layer of electron-emitting material.

52. (New) The cathode of claim 51, comprising a metal layer exhibiting a grain size smaller than said base interposed between said base and said layer.

53. (New) The cathode of claim 51, with said conductive material comprising 0.01%

by weight to 30% by weight of said layer.

54. (New) The cathode of claim 51, with said conductive material comprising a specific resistance not greater than 10^{-1} ohms centimeter.

55. (New) The cathode of claim 51, comprised of said layer exhibiting a surface roughness corresponding to a distance between a highest point and a lowest point on a surface of the electron-emitting material being less than 10 microns.

56. (New) The cathode of claim 51, with said metal base comprising a thickness in a range of 30 microns to 80 microns.

57. (New) A cathode, comprising:

a metal base;

a layer disposed upon said base, said layer comprised of:

an electron-emitting material, and

a needle-shaped electrically conductive material exhibiting a specific resistance less than said electron-emitting material, disposed within said layer.

58. (New) The cathode of claim 57, comprised of said needle-shaped electrically conductive material providing electrically conductive paths in said layer of electron-emitting

material.

59. (New) The cathode of claim 57, comprised of said layer exhibiting a surface roughness corresponding to a distance between a highest point and a lowest point on a surface of the electron-emitting material being less than 10 microns.

60. (New) The cathode of claim 57, with said conductive material comprising a specific resistance not greater than 10^{-1} ohms centimeter.

61. (New) The cathode of claim 57, comprised of said layer having a thickness in a range of 30 microns to 80 microns.

62. (New) The cathode of claim 57, with said conductive material comprising 0.01% by weight to 30% by weight of said layer.

63. A cathode, comprising:

a metal base;

a layer disposed upon said base, said layer comprised of:

an electron-emitting material, and

a needle-shaped electrically conductive material exhibiting a specific resistance not greater than 10^{-1} ohms centimeter.

64. (New) The cathode of claim 63, comprising a metal layer exhibiting a grain size smaller than said base interposed between said base and said layer.

65. (New) The cathode of claim 63, with said conductive material comprising 0.01% by weight to 30% by weight of said layer.

66. (New) The cathode of claim 63, comprised of said layer exhibiting a surface roughness corresponding to a distance between a highest point and a lowest point on a surface of the electron-emitting material being less than 10 microns.

67. (New) The cathode of claim 63, with said metal base comprising a thickness in a range of 30 microns to 80 microns.

68. (New) A cathode, comprising:

a metal base;

a layer of an electron-emitting barium-based alkali-earth metal carbonate material disposed upon said base; and

a needle-shaped electrically conductive material providing electrically conductive paths in said layer of electron-emitting material.

69. (New) The cathode of claim 68, comprising a metal layer exhibiting a grain size smaller than said base interposed between said base and said layer.

70. (New) The cathode of claim 68, with said conductive material comprising 0.01% by weight to 30% by weight of said layer.

71. (New) The cathode of claim 68, with said conductive material comprising a specific resistance not greater than 10^{-1} ohms centimeter.

72. (New) A cathode, comprising:

a metal base; and

a layer formed on said base, from a carbonate paste comprised of a barium-based carbonate electron-emitter and a needle-shaped electrically conductive powder.

73. (New) The cathode of claim 72, comprising a metal layer exhibiting a grain size smaller than said base interposed between said base and said layer.

74. (New) The cathode of claim 72, with said conductive powder comprising 0.01% by weight to 30% by weight of said layer.

75. (New) The cathode of claim 72, with said conductive material comprising a

specific resistance not greater than 10^{-1} ohms centimeter.

76. (New) The cathode of claim 72, comprised of said layer exhibiting a surface roughness corresponding to a distance between a highest point and a lowest point on a surface of the electron-emitting material being less than 10 microns.

77. (New) The cathode of claim 72, with said metal base comprising a thickness in a range of 30 microns to 80 microns.

78. (New) A method of preparing a cathode for an electron tube, comprising the steps of:

providing a metal base;

depositing on said base a carbonate paste comprising a barium-based carbonate electron emitter and a needle-shaped conductive material; and

coating the carbonate paste containing the needle-shaped conductive material onto the metal base, and then drying to form an electron-emitting layer of the cathode.